CLAIMS

We claim:

1. A method for managing bandwidth in a packet data network in response to subscriber defined polices, said network including a service manager of a network service provider, a plurality of access hubs, and an access network, said service manager including a policy server entity, a call processing entity, a bandwidth management processing entity and a data store, said method comprising the steps of:

storing in the data store bandwidth management policies as defined by a subscriber for the plurality of access hubs and the line numbers assigned to that subscriber;

communicating said policies to the policy server entity in the service manager of the network service provider;

in response to a request for modification of the maximum bandwidth parameter in the communicated policy for one access hub of the subscriber, determining in the call processing entity in the service manager a current bandwidth utilization at the one access hub and whether the current bandwidth utilization exceeds a maximum bandwidth defined by the subscriber and stored in the data store; and

if such determination indicates that the requested bandwidth utilization exceeds the maximum bandwidth defined by the subscriber and stored in the data store, performing policy processing in the bandwidth management processing entity of the service manager.

2. The method of claim 1 wherein the step of communicating said policies to the policy server entity of the service manager includes the steps of:

communicating the defined policies from a data communications terminal to a configuration and provisioning entity; and

communicating the defined policies from the configuration and provisioning entity to the policy server entity of the service manager.

3. The method of claim 1 wherein the step of performing policy processing further includes the steps of:

retrieving the bandwidth management policies defined for the one access hub from the data store of the service manager;

determining a call treatment rule for existing sessions at the one access hub;

if the call treatment rule indicates graceful reduction of bandwidth for existing sessions, invoking normal call processing in the call processing entity; and

if the call treatment rule indicates forced reduction of bandwidth for existing sessions, performing the steps of:

retrieving the session and the service provider bandwidth management policies from the data store of the service manager;

analyzing, in the bandwidth management processing entity in the service manager information contained in the access hub, session, and service provider bandwidth management policies to identify an existing session at the one access hub for bandwidth reduction;

in response to a successful identification of a session for bandwidth reduction, modifying the connectivity for the identified session;

in response to an indication of successful connectivity modification, determining in the call processing entity in the service manager a new bandwidth utilization for the one access hub and whether the new bandwidth utilization exceeds the maximum bandwidth defined by the subscriber and stored in the data store; and

if such determination indicates that the new bandwidth utilization exceeds the maximum bandwidth defined by the subscriber and stored in the data store, repeating policy processing in the bandwidth management processing entity to identify another session for bandwidth reduction.

4.   The method of claim 3 wherein the step of analyzing the information contained in the access hub, session, and service provider bandwidth management policies includes analyzing a bandwidth reduction eligibility parameter defined by the subscriber and stored in the session policy and the charge class parameters defined by the service provider and stored in the service provider policy.

5.   The method of claim 3 wherein the step of modifying the connectivity for the identified session further includes the steps of:

communicating a request for bandwidth management to each access hub and network gateway associated with the identified session; and

communicating from each access hub and network gateway to the service manager an indication of whether the bandwidth reduction was successful.

6.   A method for managing bandwidth in a packet data network in response to subscriber defined polices, said network including a service manager of a network service provider, a plurality of access hubs, and an access network, said service manager including a policy server entity, a call processing entity, a bandwidth management processing entity and a data store, said method comprising the steps of:

storing in the data store bandwidth management policies as defined by a subscriber for the plurality of access hubs and the line numbers assigned to that subscriber;

identifying a call attempt at one access hub;

determining, in the service manager, whether policy-based bandwidth management is supported for the subscriber;

if policy-based bandwidth management is supported by the subscriber, retrieving bandwidth management policies associated with the subscriber and the service provider from the data store in the service manager;

determining, in the call processing entity, a bandwidth utilization required to support the new session at the one access hub and whether the required bandwidth utilization exceeds a maximum bandwidth defined by the subscriber and stored in the data store of the service manager; and

if such determination indicates that the required bandwidth exceeds the maximum bandwidth defined by the subscriber and stored in the data store, performing policy processing in the bandwidth management processing entity.

7. The method of claim 6 wherein the call attempt is a call origination from the subscriber.

8. The method of claim 6 wherein the call attempt is a call termination to the subscriber.

9. The method of claim 6 wherein the step of performing policy processing further includes the steps of:

retrieving the bandwidth management policies defined for the one access hub from the data store of the service manager;

determining a call treatment rule for existing sessions at the one access hub;

if the call treatment rule indicates graceful reduction of bandwidth for existing sessions, invoking normal call processing in the call processing entity; and

if the call treatment rule indicates forced reduction of bandwidth for existing sessions, performing the steps of:

retrieving the session and the service provider bandwidth management policies from the data store of the service manager;

analyzing, in the bandwidth management processing entity in the service manager information contained in the access hub, session, and service provider

bandwidth management policies to identify an existing session at the one access hub for bandwidth reduction;

in response to a successful identification of a session for bandwidth reduction, modifying the connectivity for the identified session;

in response to an indication of successful connectivity modification, determining in the call processing entity in the service manager a new bandwidth utilization for the one access hub and whether the new bandwidth utilization exceeds the maximum bandwidth defined by the subscriber and stored in the data store; and

if such determination indicates that the new bandwidth utilization exceeds the maximum bandwidth defined by the subscriber and stored in the data store, repeating policy processing in the bandwidth management processing entity to identify another session for bandwidth reduction.

10. The method of claim 9 wherein the step of analyzing the information contained in the access hub, session, and service provider bandwidth management policies includes analyzing a bandwidth reduction eligibility parameter defined by the subscriber and stored in the session policy and the charge class parameters defined by the service provider and stored in the service provider policy.

11. The method of claim 9 wherein the step of modifying the connectivity for the identified session further includes the steps of:

communicating a request for bandwidth management to each access hub and network gateway associated with the identified session; and

communicating from each access hub and network gateway to the service manager an indication of whether the bandwidth reduction was successful.

12. A method for managing bandwidth in a packet data network in response to subscriber defined polices, said network including a service manager of a network service provider, a plurality of access hubs, and an access network, said service manager including a policy server entity, a call processing entity, a bandwidth management processing entity and a data store, said method comprising the steps of:

storing in the data store bandwidth management policies as defined by a subscriber for the plurality of access hubs and the line numbers assigned to that subscriber;

detecting a mid-call event at one access hub;

communicating from the one access hub to the service manager an indication that the mid-call event was detected;

determining, in the service manager, whether policy-based bandwidth management is supported for the subscriber;

if policy-based bandwidth management is supported for the subscriber, retrieving bandwidth management policies associated with the subscriber and the service provider from the data store of the service manager;

determining in the call processing entity a bandwidth utilization required to support the mid-call event at the one access hub and whether the required bandwidth exceeds a maximum bandwidth defined by the subscriber and stored in the data store; and

if such determination indicates that the required bandwidth exceeds the maximum bandwidth defined by the subscriber and stored in the data store, performing policy processing in the bandwidth management processing entity of the service manager.

13. The method of claim 12 wherein the mid-call event is a fax tone or modem tone detected event.

14. The method of claim 12 wherein the mid-call event is a request to support conference mode.

15. The method of claim 12 wherein the step of performing policy processing further includes the steps of:

retrieving the bandwidth management policies defined for the one access hub from the data store of the service manager;

determining a call treatment rule for existing sessions at the one access hub;

if the call treatment rule indicates graceful reduction of bandwidth for existing sessions, invoking normal call processing in the call processing entity; and

if the call treatment rule indicates forced reduction of bandwidth for existing sessions, performing the steps of:

retrieving the session and the service provider bandwidth management policies from the data store of the service manager;

analyzing, in the bandwidth management processing entity in the service manager information contained in the access hub, session, and service provider bandwidth management policies to identify an existing session at the one access hub for bandwidth reduction;

in response to a successful identification of a session for bandwidth reduction, modifying the connectivity for the identified session;

in response to an indication of successful connectivity modification, determining in the call processing entity in the service manager a new bandwidth utilization for the one access hub and whether the new bandwidth utilization exceeds the maximum bandwidth defined by the subscriber and stored in the data store; and

if such determination indicates that the new bandwidth utilization exceeds the maximum bandwidth defined by the subscriber and stored in the data store, repeating policy processing in the bandwidth management processing entity to identify another session for bandwidth reduction.

16. The method of claim 15 wherein the step of analyzing the information contained in the access hub, session, and service provider bandwidth management policies includes analyzing a bandwidth reduction eligibility parameter defined by the subscriber and stored in the session policy and the charge class parameters defined by the service provider and stored in the service provider policy.

17. The method of claim 15 wherein the step of modifying the connectivity for the identified session further includes the steps of:

communicating a request for bandwidth management to each access hub and network gateway associated with the identified session; and

communicating from each access hub and network gateway to the service manager an indication of whether the bandwidth reduction was successful.

18. A system for managing bandwidth in a packet data network in response to policies defined by a plurality of subscribers, the packet data network including a backbone packet network, a public switched telephone network, an access network, and a plurality of subscriber networks, said system comprising:

a plurality of access hubs connected to the subscribers through the subscriber networks;

a network gateway connected to the access network, telephone network and the backbone packet network;

a service manager with policy-based bandwidth management capabilities connected to the plurality of access hubs, the network gateway, and the configuration and provisioning entity;

a configuration and provisioning entity connected to the plurality of subscribers and the service manager, said configuration and provision entity receiving policy updates from subscribers;

an advanced intelligent network service control point connected to the service manager, said advanced intelligent network service control point communicating policy updates to the service manager; and

a service management system connected to the advanced intelligent network service control point, said service management system communicating policy updates to the advanced intelligent network.

19. The system in accordance with claim 18 wherein the configuration and provisioning entity further includes a graphical user interface, a web server interface, and a craft interface, said interfaces connected to a plurality of data communication terminals of the subscriber via a data communication link for communicating policy updates from the subscribers.

20. A service manager with policy-based bandwidth management capabilities, said service manager comprising:

a call processing entity;

a bandwidth management processing entity;

a policy server entity; and

a data store containing bandwidth management policies defined by a subscriber and by a service provider.